



Catalog PB.G7.02.NP
G7 Drives for Industrial Automation

YASKAWA

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Other Documents and Manuals are available to support special use or installation of this product. These documents may be provided with the product or upon request. Contact Yaskawa Electric America, Inc. as required. Documents may include the following:

TM.G7.01... Drive Technical Manual included on CD ROM with product

TM.AFD.12.ProfibusDP... Manual included on CD ROM with product

TM.AFD.13.DeviceNet... Manual included on CD ROM with product

TM.AFD.14.DeviceNet... Manual included on CD ROM with product

TM.AFD.17.Modbus Plus... Manual included on CD ROM with product

TM.AFD.20.LonWorks... Manual included on CD ROM with product

DriveWizard... Software and Manual...Included on CD ROM with product

Option Installation Guides... Included on CD ROM with product

Description

1/2 – 500HP
G7 Drive

G7



This amazing AC drive is the ultimate performance solution with increased speed and torque response to provide servo-like performance from an induction motor. In addition, the G7 drive for 480V includes the world's first general purpose drive architecture that eliminates or minimizes the installation problems associated with IGBT switching and protects the entire motor-drive system.

G7 drive performance makes it the ideal drive for high performance speed, torque, or position control applications. Several control modes are provided. In open loop vector mode, the latest flux observer algorithms extend speed range and provide maximum starting torque. In closed loop vector mode, 0.01% speed regulation and 1000:1 control range can be achieved. Zero-servo capability provides position control at zero speed.

The G7 drive for 480V has the world's first 3-Level Inverter architecture for total system protection. This patented 3-Level architecture can eliminate peripheral components typically required to solve installation problems. This architecture allows motor operation at very long cable lengths, meeting NEMA MG1 Part 31, with peak voltage being 30% less than standard inverters. With motor bearing current being typically 50% less than with standard drive designs, the G7 does not contribute to diminished motor bearing life. Audible motor noise on the G7 drive is 5-10dB (20%) less than the prior generation drive, even when operating at half the carrier frequency. Common mode current is half that of competitor drives.

The G7 drive has three auto-tuning methods to optimize motor control, including the new static auto-tuning which does not require load decoupling nor motor rotation. It also has a large programming feature set to handle sophisticated industrial applications. If the standard feature set does not meet your specific requirement, the G7 can be programmed using DriveWorksEZ™. This is a PC-based, object-oriented, graphical icon programming tool that is friendly to the user. The drive firmware can also be modified by custom or prewritten application-specific modules such as Motion Control or Electronic Lineshaft.

The G7 is not intended for the simple, routine AC drive application; it is for the challenges. The G7 drive offers the ultimate performance, the best system protection, and the most flexible configurations of any drive available.

Performance Features

- Ratings: 1/2 to 150HP, 208 VAC
1/2 to 150HP, 240 VAC
3/4 to 500HP, 480 VAC
- Overload capacity: heavy duty, 150% for 1 min, 200% Peak
- Starting torque:
150% at 1Hz (V/f), at 0.5 Hz (open loop), at 0.3 Hz (closed loop)
- Output frequency: 0.01 to 400Hz
- Speed control range:
40:1 (V/f), 200:1 (open loop), 1000:1 (closed loop)
- Speed regulation:
1% (V/f), 0.2% (open loop), 0.01% (closed loop)
- Speed response: 60Hz
- Torque response: 300Hz
- Speed reference resolution: 0.01% with digital reference, 0.1% with analog reference, 0.01 Hz with network input
- Speed/Torque/Position Control
- Zero-servo mode
- Adjustable accel/decel: 0.01 to 6000 seconds
- S-Curve: adjustable 0.00 to 2.50 seconds, for each corner
- Stall prevention
- Inertia and Power loss ride-thru
- Programmable auto restart after momentary power loss

Protective Features

- DC bus CHARGE indicator
- Optically-Isolated controls
- Phase-to-phase / phase-to-neutral short circuit protection
- Ground fault protection
- Electronic motor overload (UL508C)
- Current and torque limit (four quadrant)
- Over-torque / under-torque detection
- Over-current, over-voltage, and overtemperature
- Motor thermistor input
- Input/output phase loss

Design Features

- LCD keypad display: 5 lines x 16 characters, backlit, 7 languages, copy function
- Speed presets: 17 available
- Process PID with trim
- Signal follower: bias and gain
- Up / down / hold reference (digital M.O.P.)
- Timer function: Programmable on/off delay
- 32-bit microprocessor logic
- Simple programming: quick start parameter group
- Non-volatile memory/program retention
- Flash RAM software memory for update and custom applications
- 24VDC control logic (sinking and sourcing)
- DC injection braking, adjustable level
- Dynamic braking transistor: 10 HP and below (240VAC), 20 HP and below (460VAC)
- High-slip braking
- Ramp to stop, coast to stop, or fast stop
- Dual motor parameter sets
- Synchronized start into rotating motor
- Motor auto-tuning, static and dynamic
- Common DC bus capability
- DC link choke: 25 HP and above (240VAC) 30HP and above (460VAC)
- Twelve-pulse capability: 25 HP and above (240VAC) 30HP and above (460VAC)
- Terminal strip: quick disconnect
- Split front cover for easy wiring
- Heat sink fan: Plug-in with on-off control

Service Conditions

- Ambient service temperatures:
-10 to 40°C (104°F) NEMA1, to 45°C (113°F) protected chassis
- Humidity: non-condensing 95% max
- Altitude: to 3300 feet (1000 meter)
- Input voltage: +10% / -15%, 3 phase, 240 or 480VAC, phase insensitive
- Enclosure: NEMA 1 or protected chassis
- Input frequency: 50/60Hz ± 5%
- Vibration: 1G (10 to 20Hz), 0.6G or less (20 to 55Hz)

Inputs and Outputs

- Analog inputs: 3 (2 programmable) -10 to +10VDC (20K ohms) or 4 to 20 mA (250 ohm) 11 bit plus sign
- Analog outputs: 2 programmable -10 to +10VDC or 4-20mA proportional to output parameters 9 bit plus sign
- Digital inputs: 12 (10 programmable) sinking or sourcing
- Digital outputs: 5 programmable, three form A and two open collector
- Pulse train input: 1 programmable 32 KHz max
- Pulse train output: 1 programmable 32 KHz max
- Fault contacts: One form C
- RS-232/422/485: Modbus RTU

Standards & Reliability

- UL, cUL & CE listed
- IEC: 146A
- MTBF: Exceeds 28 years

Options

- Remote display/keypad
- High resolution I/O cards
- DriveWizard™ software (upload / download)
- DriveWorksEZ™ programming tool
- DeviceNet, Profibus-DP, Ethernet, and others
- Custom drive software
- 120 VAC interface
- Input breaker, disconnect, fuses
- NEMA 12 enclosures
- Input/output reactors
- EMC-compliant filters
- DC bus choke if not standard
- Line regeneration (RC5 or DC5)
- Dynamic braking if not standard

Three-Level Inverter (480V)

- Lead length, meets NEMA MG1 Part 31
- No reduction of motor bearing life

G7**List Prices**3-Phase ⁽¹⁾, 208-230/240V
G7 Drive

Rated Input Voltage	Basic Drive Model Number CIMR-G7U	Rated Output Current (Amps)	Nominal HP ⁽²⁾	Standard Enclosure	Drive List Price \$
208V	20P41	3.2	1/2	NEMA 1	
	20P71	6	1	NEMA 1	
	21P51	8	2	NEMA 1	
	22P21	12	3	NEMA 1	
	23P71	18	5	NEMA 1	
	25P51	27	7.5	NEMA 1	
	27P51	34	10	NEMA 1	
	20111	49	15	NEMA 1	
	20151	66	20	NEMA 1	
	20181	80	25	NEMA 1	
	20221	96	30	NEMA 1	
	20300	130	40	Protected Chassis	
	20370	160	50		
	20450	183	60	Protected Chassis	
	20550	224	75		
240V	20750	300	100	Protected Chassis	
	20900	358	125		
	21100	415	150		
	20P41	3.2	3/4	NEMA 1	
	20P71	6	1	NEMA 1	
	21P51	8	2	NEMA 1	
	22P21	12	3	NEMA 1	
	23P71	18	5	NEMA 1	
	25P51	27	7.5	NEMA 1	
	27P51	34	10	NEMA 1	
230V	20111	49	15	NEMA 1	
	20151	66	20	NEMA 1	
	20181	80	25	NEMA 1	
	20221	96	30 ⁽³⁾	NEMA 1	
	20300	130	40 50	Protected Chassis	
	20370	160	60	Protected Chassis	
	20450	183	60 ⁽³⁾		
	20550	224	75	Protected Chassis	
	20750	300	100		
	20900	358	125	Protected Chassis	
	21100	415	150	Protected Chassis	

(1) For single-phase input, consult Yaskawa

(2) Horsepower rating is based on standard NEMA B 4-pole motor design as represented in NEC table 430.150 Full-Load Current, Three-Phase Alternating Current Motors

(3) Check motor FLA for proper drive sizing

List Prices
3-Phase⁽¹⁾, 480V
G7 Drive

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Rated Input Voltage	Basic Drive Model Number CIMR-G7U	Rated Output Current (Amps)	Nominal HP ⁽²⁾	Standard Enclosure	Drive List Price \$
480V	40P41	1.8	3/4	NEMA 1	
	40P71	3.4	1 2	NEMA 1	
	41P51	4.8	3	NEMA 1	
	42P21	6.2	3 ⁽³⁾	NEMA 1	
	43P71	9	5	NEMA 1	
	44P01	11	7.5	NEMA 1	
	45P51	15	10	NEMA 1	
	47P51	21	15	NEMA 1	
	40111	27	20	NEMA 1	
	40151	34	25	NEMA 1	
	40181	42	30	NEMA 1	
	40221	52	40	NEMA 1	
	40301	65	50		
	40371	80	60	NEMA 1	
	40451	97	75		
	40550	128	100	Protected Chassis	
	40750	165	125		
	40900	195	150	Protected Chassis	
	41100	240	200		
	41320	270	200 ⁽³⁾	Protected Chassis	
	41600	302	250		
	41850	370	300	Protected Chassis	
	42200	450	350		
	43000	605	400 500	Protected Chassis	

(1) For single-phase input, consult Yaskawa

(2) Horsepower rating is based on standard NEMA B 4-pole motor design as represented in NEC table 430.150 Full-Load Current, Three-Phase Alternating Current Motors

(3) Check motor FLA for proper drive sizing

G7**List Prices****Options****G7 Drive**

Dynamic Braking, 10% Duty Cycle - is used to assist the drive to periodically decelerate a load without overvoltage trips. Ten percent dynamic braking is not typically used for "hold-back" type applications, such as unwinders, elevators, hoists, or downhill conveyors. Dynamic braking consists of at least one transistor and at least one resistor, and are sized for rated motor horsepower. The braking transistor may be included in the standard drive; this is indicated in the tables below. The resistors are sized for a 10% duty cycle (10 seconds maximum on-time of every 100 seconds), and will provide approximately 150% braking torque. Refer to the dynamic braking instruction sheet for more details; consult Yaskawa for information on higher duty cycles.

Rated Input Voltage	Drive Model Number CIMR-G7U	Nominal HP ⁽¹⁾	Transistor Module(s)			Resistor(s)						
			Part Number CDBR-	Qty	List Price (ea.) \$	Part Number URS000	Qty	List Price \$	Config-uration ⁽²⁾	Total List Price \$		
208V	20P41	1/2	Included			034	1		Single ⁽³⁾			
	20P71	3/4	Included			022	1		Single ⁽³⁾			
	21P51	2	Included			023	1		Single ⁽³⁾			
	22P21	3	Included			024	1		Single ⁽³⁾			
	23P71	5	Included			025	1		Single ⁽³⁾			
	25P51	7.5	Included			026	1		Single ⁽³⁾			
	27P51	10	Included			027	1		Single ⁽³⁾			
	20111	15	Included			140	1		Single ⁽⁴⁾			
	20151	20	Included			136	1		Single ⁽⁴⁾			
	20181	25	2022B	2		135	1		Dual			
	20221	30				135	1		Dual			
	20300	40				129	1		Dual			
	20370	50	2110B	1		100	1		Single			
	20450	60										
	20550	75	2110B & 2022B	1 each		096	1		Single			
	20750	100				096 & 128	1 each		Single			
	20900	125	2110B & 2022B	1	2	096 & 127	1 each		Single			
	21100	150				097	1		Dual			
230/240V	20P41	1/2 3/4	Included			034	1		Single ⁽³⁾			
	20P71	1	Included			022	1		Single ⁽³⁾			
	21P51	2	Included			023	1		Single ⁽³⁾			
	22P21	3	Included			024	1		Single ⁽³⁾			
	23P71	5	Included			025	1		Single ⁽³⁾			
	25P51	7.5	Included			026	1		Single ⁽³⁾			
	27P51	10	Included			027	1		Single ⁽³⁾			
	20111	15	Included			140	1		Single ⁽⁴⁾			
	20151	20	Included			136	1		Single ⁽⁴⁾			
	20181	25 30	2022B	2		135	2		Dual			
	20221	30				135	2		Dual			
	20300	50 60				100	1		Single			
	20370	60	2110B	1		100	1		Single			
	20450	75				096	1		Single			
	20550	75	2110B & 2022B	1 each		096 & 128	1 each		Single			
	20750	100							Single			
	20900	125	2110B & 2022B	1	2	096 & 127	1 each		Single			
	21100	150				097	1		Dual			

(1) Horsepower rating is based on standard NEMA B 4-pole motor design as represented in NEC table 430.150 Full-Load Current, Three-Phase Alternating Current Motors

(2) Single = 1 resistor per package

 Dual = 2 resistors per package (requires 2 DB transistor modules, as indicated in table above)

 Triple = 3 resistors per package (requires 3 DB transistor modules, as indicated in table above)

(3) This resistor package provides 120% braking torque

(4) This resistor package provides 100% braking torque

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Dynamic Braking, 10% Duty Cycle (continued for 480V)

Rated Input Voltage	Drive Model Number CIMR-G7U	Nominal HP ⁽¹⁾	Transistor Module(s)			Resistor(s)				
			Part Number CDBR-	Qty	List Price (ea.) \$	Part Number URS000	Qty	List Price \$	Config-uration (2)	Total List Price \$
480V	40P41	3/4	Included			032	1		Single ⁽³⁾	
	40P71	1	Included			033	1		Single ⁽³⁾	
		2								
	41P51	3	Included			034	1		Single ⁽³⁾	
	42P21	3								
	43P71	5	Included			035	1		Single ⁽³⁾	
	44P01	7.5				036	1		Single ⁽³⁾	
	45P51	10	Included			037	1		Single ⁽³⁾	
	47P51	15				038	1		Single ⁽³⁾	
	40111	20	Included			040	1		Single ⁽³⁾	
	40151	25								
	40181	30	4045B	1		150	1		Single	
	40221	40				142	1		Single	
	40301	50				151	1		Dual	
	40371	60	4045B	2		151	1		Dual	
	40451	75				143	1		Dual	
	40550	100	4220B	1		119	1		Single	
	40750	125								
	40900	150	4220B	1		165	1		Single	
	41100	200	4220B & 4045B	1		165 & 142	1 each		Single	
	41320	200	4220B & 4045B	1		165 & 142	1 each		Single	
	41600	250	4220B & 4045B	1		165 & 143	1 each		Single	
	41850	300	4220B	2		166	1		Dual	
	42000	350	4220B	3		120 & 165	1		Dual	
	43000	450 500	4220B	3		167	1		Triple	

(1) Horsepower rating is based on standard NEMA B 4-pole motor design as represented in NEC table 430.150 Full-Load Current, Three-Phase Alternating Current Motors

(2) Single = 1 resistor per package

Dual = 2 resistors per package (requires 2 DB transistor modules, as indicated in table above)

Triple = 3 resistors per package (requires 3 DB transistor modules, as indicated in table above)

(3) This resistor package provides 120% braking torque

(4) This resistor package provides 100% braking torque

G7**List Prices**
Options
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Dynamic Braking, 3% Duty Cycle - is used to assist the drive to periodically decelerate a load without overvoltage trips. Three percent dynamic braking is not applicable for "hold-back" type applications, such as unwinders, elevators, hoists, or downhill conveyors. Dynamic braking consists of at least one transistor and at least one resistor, and are sized for rated motor horsepower. The braking transistor is included in the standard drive for these resistors. The resistors are sized for a 3% duty cycle (3 seconds maximum on-time of every 100 seconds), and will provide at least 100% braking torque. Refer to the dynamic braking instruction sheet for more details; consult Yaskawa for information on higher duty cycles. These resistors can be mounted directly to the heatsink on the back of the drive.

Rated Input Voltage	Drive Model Number CIMR-G7U	Nominal HP ⁽¹⁾	Resistor			
			Part Number	Qty	List Price \$	Braking Torque %
208V	20P41	1/2	R7505	1		220
	20P71	1	R7505	1		125
	21P51	2	R7504	1		125
	22P21	3	R7503	1		120
	23P71	5	R7510	1		100
240V	20P41	1/2 3/4	R7505	1		220
	20P71	1	R7505	1		125
	21P51	2	R7504	1		125
	22P21	3	R7503	1		120
	23P71	5	R7510	1		100
480V	40P41	3/4	R7508	1		230
	40P71	1 2	R7508	1		130
	41P51	3	R7507	1		125
	42P21	3	R7506	1		115
	43P71	5	R7505	1		110

(1) Horsepower rating is based on standard NEMA B 4-pole motor design as represented in NEC table 430.150 Full-Load Current, Three-Phase Alternating Current Motors

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End Cap Kits, NEMA 1 - This option consists of a top and bottom cover to convert a protected chassis drive to a NEMA 1 enclosed unit. This option DOES NOT have additional space for mounting auxilliary components (i.e. circuit breaker, input fuses, reactor, etc.).

Rated Input Voltage	Basic Drive Model Number CIMR-G7U	Kit Model No. UDA00365-	Overall Drive Dimensions			Endcaps List Price \$
			Height (in.)	Width (in.)	Depth (in.)	
208- 230/ 240V	20P41 thru 20221		Not Required			
	20300 20370	C	31.85	14.96	No Change	
	20450 20550	E	40.43	17.83	No Change	
	20750	F	48.94	19.84	No Change	
	20900 21100		Not Available			
	40P41 thru 40451		Not Required			
480V	40550 40750	E	40.43	17.83	No Change	
	40900 41100	F	48.94	19.84	No Change	
	41320 41600	P	52.13	22.80	No Change	
	41850 42200 43000		Not Available			

G7**List Prices****Options****G7 Drive**

Reactor, 3% and 5% Impedance - may be used on either the input or output of a drive to reduce the effect of load or line side transients on the drive. The three-phase reactors are available loose in a separate NEMA 1 enclosure.

Rated Input Voltage	Basic Drive Model Number CIMR-G7U	Rated Output Current (Amps)	3% Enclosed Reactor				5% Enclosed Reactor					
			Part Number 05P00620-	List Price \$	Dimensions (in)			Part Number 05P00620-	List Price \$	Dimensions (in)		
			H	L	W				H	L	W	
208V	20P41	3.2	0020		8.0	8.0	6.0	0021		8.0	8.0	6.0
	20P71	6	0027					0028				
	21P51	8	0032		8.0	8.0	6.0	0033		8.0	8.0	6.0
	22P21	12	0036					0032				
	23P71	18	0041		13.0	13.0	13.0	0036		8.0	8.0	6.0
	25P51	27	0046					0047		13.0	13.0	13.0
	27P51	34	0050		13.0	13.0	13.0	0048		13.0	13.0	13.0
	20111	49	0054					0055				
	20151	66	0058		13.0	13.0	13.0	0059		13.0	13.0	13.0
	20181	80	0172					0062				
	20221	96	0066		13.0	13.0	13.0	0067		13.0	13.0	13.0
	20300	130	0066					0067				
	20370	160	0072		13.0	13.0	13.0	0073		13.0	13.0	13.0
	20450	183	0077					0078				
	20550	224	0082		13.0	13.0	13.0	0083		24.0	17.0	17.0
	20750	300	0087		24.0	17.0	17.0	0088				
	20900	358	0173		24.0	17.0	17.0	0092		24.0	17.0	17.0
	21100	415	0174					0096				
230/240V	20P41	3.2	0020		8.0	8.0	6.0	0021		8.0	8.0	6.0
	20P71	6	0027					0028				
	21P51	8	0027		8.0	8.0	6.0	0028		8.0	8.0	6.0
	22P21	12	0036					0037				
	23P71	18	0036		8.0	8.0	6.0	0037		8.0	8.0	6.0
	25P51	27	0046		13.0	13.0	13.0	0047		13.0	13.0	13.0
	27P51	34	0050		13.0	13.0	13.0	0051		13.0	13.0	13.0
	20111	49	0054					0055				
	20151	66	0058		13.0	13.0	13.0	0059		13.0	13.0	13.0
	20181	80	0172					0062				
	20221	96	0172		13.0	13.0	13.0	0062		13.0	13.0	13.0
	20300	130	0066					0067				
	20370	160	0072		13.0	13.0	13.0	0073		13.0	13.0	13.0
	20450	183	0077					0078				
	20550	224	0082		13.0	13.0	13.0	0083		24.0	17.0	17.0
	20750	300	0087		24.0	17.0	17.0	0088				
	20900	358	0173		24.0	17.0	17.0	0092		24.0	17.0	17.0
	21100	415	0174					0096				

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G7**Reactor, 3% and 5% Impedance (continued for 480V)**

Rated Input Voltage	Basic Drive Model Number CIMR-G7U	Rated Output Current (Amps)	3% Enclosed Reactor				5% Enclosed Reactor					
			Part Number 05P00620-	List Price \$	Dimensions (in)			Part Number 05P00620-	List Price \$	Dimensions (in)		
					H	L	W			H	L	W
480V	40P41	1.8	0015		8.0	8.0	6.0	0016		8.0	8.0	6.0
	40P71	3.4	0021					0022				
	41P51	4.8	0029		8.0	8.0	6.0	0030		8.0	8.0	6.0
	42P21	6.2	0028					0030				
	43P71	9	0028		8.0	8.0	6.0	0029		8.0	8.0	6.0
	44P01	11	0033					0034				
	45P51	15	0037		8.0	8.0	6.0	0038		13.0	13.0	13.0
	47P51	21	0042		13.0	13.0	13.0	0043				
	40111	27	0047		13.0	13.0	13.0	0048		13.0	13.0	13.0
	40151	34	0051					0048				
	40181	42	0055		13.0	13.0	13.0	0056		13.0	13.0	13.0
	40221	52	0055					0056				
	40301	65	0059		13.0	13.0	13.0	0060		13.0	13.0	13.0
	40371	80	0062					0063				
	40451	97	0062		13.0	13.0	13.0	0063		13.0	13.0	13.0
	40550	128	0067					0068				
	40750	165	0073		13.0	13.0	13.0	0074		13.0	13.0	13.0
	40900	195	0078					0079				
	41100	240	0083		24.0	17.0	17.0	0084		24.0	17.0	17.0
	41320	270	0088					0089				
	41600	302	0088		24.0	17.0	17.0	0089		24.0	17.0	17.0
	41850	370	0092					0093				
	42200	450	0096		24.0	17.0	17.0	0097		24.0	17.0	17.0
	43000	605	0100					0101				

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List Prices
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G7 Drive

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DC Bus Reactor - may be used on the DC bus of a drive to reduce the effect of line side transients on the drive. The DC bus reactors are available loose in an open configuration.

Rated Input Voltage	Basic Drive Model Number CIMR-G7U	Rated Output Current (Amps)	3% DC Bus Reactor				5% DC Bus Reactor					
			Part Number	List Price \$	Dimensions (in)			Part Number	List Price \$	Dimensions		
					H	L	W			H	L	W
208V	20P41	3.2	URX000040		2.50	2.88	1.50	URX000041		3.25	3.75	2.00
	20P71	6	TBD		3.25	3.75	2.00	05P00620-0111		4.50	3.81	2.82
	21P51	8	URX000045		4.50	3.81	2.82	05P00652-0213		4.50	3.81	2.82
	22P21	12	TBD		4.50	3.81	2.82	URX000048		4.50	3.81	3.75
	23P71	18	URX000051		4.50	3.81	2.82	URX000053		4.50	3.81	3.00
	25P51	27	05P00620-0120		4.31	3.81	3.32	URX000055		5.25	4.63	4.25
	27P51	34	05P00620-0123		4.50	3.81	3.13	URX000057		5.25	4.63	4.00
	20111	49	URX000063		4.00	4.63	5.00	URX000065		5.50	6.50	6.25
	20151	66	05P00620-0129		4.00	4.63	6.00	URX000069		4.00	4.63	7.00
	20181 thru 21100	80 thru 415	Built-in; additional DC bus choke not required				Built-in; additional DC bus choke not required					
230/240V	20P41	3.2	05P00620-0111		4.50	3.81	2.82	URX000044		5.25	4.63	4.00
	20P71	6	TBD		3.25	3.75	2.00	05P00620-0111		4.50	3.81	2.82
	21P51	8	TBD		3.25	3.75	2.00	URX000046		5.25	4.63	3.50
	22P21	12	TBD		4.50	3.81	2.82	URX000048		4.50	3.81	3.75
	23P71	18	URX000052		4.50	3.81	3.75	URX000053		4.50	3.81	3.00
	25P51	27	05P00620-0120		4.31	3.81	3.32	URX000055		5.25	4.63	4.25
	27P51	34	05P00620-0124		4.50	3.81	3.75	URX000057		5.25	4.63	4.00
	20111	49	URX000063		4.00	4.63	5.00	URX000065		5.50	6.50	6.25
	20151	66	05P00620-0129		4.00	4.63	6.00	URX000069		4.00	4.63	7.00
	20181 thru 21100	80 thru 415	Built-in; additional DC bus choke not required				Built-in; additional DC bus choke not required					
480V	40P41	1.8	URX000042		4.50	3.81	2.82	URX000039		3.25	3.75	2.00
	40P71	3.4	URX000041		3.25	3.75	2.00	URX000042		4.50	3.81	2.82
	41P51	4.8	05P00620-0111		4.50	3.81	2.82	URX000044		5.25	4.63	4.00
	42P21	6.2								5.25	4.63	4.00
	43P71	9	URX000046		5.25	4.63	3.50	URX000044		5.25	4.63	4.00
	44P01	11	05P00652-0216		5.25	4.63	4.00	URX000049		5.25	4.63	5.25
	45P51	15	URX000048		4.50	3.81	3.75	URX000049		5.25	4.63	5.25
	47P51	21	URX000053		4.50	3.81	3.00	URX000054		5.25	4.63	5.25
	40111	27	URX000055		5.25	4.63	4.25	URX000056		5.25	4.63	5.25
	40151	34	URX000057		5.25	4.63	4.00	URX000058		6.55	6.50	6.00
	40181 thru 43000	42 thru 605	Built-in; additional DC bus choke not required				Built-in; additional DC bus choke not required					

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List Prices

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G7 Drive

ANALOG INPUT OPTIONS

Analog Input (14 Bit). This option provides for the interface of 2 high resolution analog inputs to the drive.

- Signal levels (fixed):
 - 1 channel, 0 to 10VDC (20kOhm)
 - 1 channel, 4 to 20mAADC (250Ohm)
- Mounts at option connector 2CN

Model No. AI-14U.....\$

Analog Input (13 Bit + Sign). This option provides for the interface of 3 high resolution analog inputs to the drive.

- Signal levels (individually selectable):
 - 0 to +/-10VDC (20kOhm),
 - 4 to 20mAADC (250Ohm)
- Mounts at option connector 2CN

Model No. AI-14B.....\$

Analog Input, Isolated (13 Bit + Sign). This option provides for the interface of 3 isolated, high resolution analog inputs to the drive.

- Signal levels (individually selectable):
 - 0 to +/-10VDC (20kOhm),
 - 0 to 20mAADC (250Ohm),
 - 4 to 20mAADC (250Ohm)
- Mounts at option connector 2CN

Model No. AI-040 (formerly AI-14B2).....\$

Trim Potentiometer. This option provides a 5kOhm potentiometer for use as a dropping resistor for maximum or minimum analog input trim.

- Mounts to control terminal strip

Model No. AI-001.....\$

3-15PSI Transducer. This option provides for the interface of a 3 to 15PSI pneumatic signal, and provides a 4 to 20mA output signal proportional to the input signal to the drive.

- Mounts to control terminal strip

Model No. AI-010.....\$

ANALOG OUTPUT OPTIONS

Analog Output (8 Bit). This option provides 2 signals for remote metering of any two of the drive's "U1" monitors. These are in addition to the two standard analog outputs.

- Signal levels (fixed):
 - 0 to 10VDC (20kOhm)
- Mounts at option connector 3CN

Model No. AO-08.....\$

Analog Output (11 Bit + Sign). This option provides 2 signals for remote metering of any two of the drive's "U1" monitors. These are in addition to the two standard analog outputs.

- Signal levels (individually selectable):
 - 0 to +/-10VDC (20kOhm)
- Mounts at option connector 3CN

Model No. AO-12.....\$

Analog Output, Isolated (11 Bit + Sign). This option provides 2 signals for remote metering of any two of the drive's "U1" parameters. These are in addition to the two standard analog outputs.

- Signal levels (individually selectable):
 - 0 to +/-10VDC (20kOhm),
 - 0 to 20mAADC (500Ohm max),
 - 4 to 20mAADC (500Ohm max)
- Mounts at option connector 3CN

Model No. AO-001 (formerly AO-12B2).....\$

DIGITAL INPUT OPTIONS

Digital Input (8 Bit). This option provides for the interface of an 8 bit digital input (binary or BCD) to the drive.

- Mounts at option connector 2CN

Model No. DI-08.....\$

Digital Input (12 or 16 Bit). This option provides for the interface of a 12 or 16 bit digital input (binary or BCD) to the drive.

- Mounts at option connector 2CN

Model No. DI-16H2.....\$

120VAC Logic Interface (8-Input). This option provides for the interface of 120VAC control logic circuits to the drive. This option is used for digital inputs S1 to S8.

- Mounts to control terminal strip

Model No. DI-001.....\$

120VAC Logic Interface (4-Input). This option provides for the interface of 120VAC control logic circuits to the drive. This option is used for digital inputs S9 to S12.

- Mounts to control terminal strip

Model No. DI-003.....\$

DIGITAL OUTPUT OPTIONS

Digital Output (2 Channel). This option provides 2 additional digital outputs for use in monitoring the status outputs of the drive.

- Signal levels:
2 channels, Form C, 250VAC, 30VDC, 1A
- *Mounts at option connector 3CN*

Model No. DO-02C.....\$

Digital Output (8 Channel). This option provides 8 additional digital outputs for use in monitoring the status outputs of the drive.

- Signal levels:
2 channels, Form A, 250VAC, 30VDC, 1A
6 channels, PHC, 48VDC, 50mA, Shared Common
- *Mounts at option connector 3CN*

Model No. DO-08.....\$

ENCODER FEEDBACK OPTIONS

Single Encoder (PG) Feedback. This option provides velocity and direction feedback from an encoder. This is primarily used for motor speed feedback in closed loop flux vector control. A 5VDC buffered output is also included.

- Signal levels:
5 or 12VDC differential line driver with compliments
Maximum input frequency: 300kHz
Phases A and B (Z required with some custom software)
- *Mounts at option connector 4CN*

Model No. PG-X2.....\$

Dual Encoder (PG) Feedback. This option provides velocity and direction feedback from 2 encoders. This card is used for 2-motor operation with standard software and for custom software titles such as Electronic Lineshaft and Motion Control. A 5VDC buffered output is also included.

- Signal levels:
5 or 12VDC differential line driver with compliments
Maximum input frequency: 300kHz
Phases A and B (Z required with some custom software)
- *Mounts at option connector 4CN*

Model No. PG-W2.....\$

DIGITAL OPERATOR OPTIONS

Digital Operator (LCD). This option is the standard digital operator found on the drive. This option is only needed if the original keypad is lost or damaged.

- Features include:
LCD keypad display, 5 lines x 16 characters, backlit
7 languages
Copy function
- *Mounts to keypad port*

Model No. UOP00008.....\$

Remote Operator Kit. This option is used to extend the existing Digital Operator to the wall of a separately priced, oversized NEMA 1 or 12 enclosure. Price includes a faceplate membrane to cover the operator cutout in the enclosure door, a 3-foot cable, a 10-foot cable, and a remote digital operator carrier.

- *Mounts to keypad port and enclosure wall.*

Model No. UOPN0005.....\$

Remote Operator Cables (3 or 10 feet). These cables allow for tethering the keypad for easier viewing.

- *Mounts to keypad port*

Model No. UWR0051 (3 feet).....\$

Model No. UWR0052 (10 feet).....\$

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Options

G7 Drive

NETWORK COMMUNICATION OPTIONS

DeviceNet. This option complies with the ODVA (Open DeviceNet Vendor Association) specification and AC drive profile. All parameter, diagnostics, and operational commands are accessible via DeviceNet. The option board provides a DeviceNet standard open tap connector. Each DeviceNet network supports up to 63 drives. Controllers are available from many PLC and/or PC suppliers. Electronic Data Sheets may be downloaded from www.drives.com to assist with network configuration and drive setup.

- Mounts at option connector 2CN. Covers 3CN.

Model No. CM057.....\$

DeviceNet. This option complies with the ODVA (Open DeviceNet Vendor Association) specification and AC drive profile. All parameter, diagnostics, and operational commands are accessible via DeviceNet. The option board provides a DeviceNet standard open tap connector. Each DeviceNet network supports up to 63 drives. Controllers are available from many PLC and/or PC suppliers. Electronic Data Sheets may be downloaded from www.drives.com to assist with network configuration and drive setup.

- Mounts at option connector 2CN.

Model No. CM059 (formerly SI-N1).....\$

Profibus DP. This option complies with the Profibus DP protocol specification. All parameters, diagnostics and operational commands are accessible via Profibus. The option board provides convenient Phoenix-type terminations for landing the shielded, twisted-pair wiring. Each Profibus network supports up to 99 drives. This option supports all of the Profibus data rates from 9.6 Kbps to 12 Mbps. Up to 32 bytes of input data and 32 bytes of output data are provided per message transaction. GSD files may be downloaded from www.drives.com to assist with network configuration and drive setup.

- Mounts at option connector 2CN.

Model No. CM061.....\$

LonWorks. This option is compatible with the Lon Mark Interoperability Association and complies with the Functional Profile for a Variable Frequency Motor Drive. The option board features the FFT-10A Free Topology Twisted-Pair Transceiver. Network connectivity is facilitated by either a Phoenix-style screw termination or RJ-45 connector.

- Mounts at option connector 2CN. Covers 3CN. Blocks 4CN.

Model No. CM048.....\$

Modbus Plus. This option complies with Modicon's ModConnect Partners program and provides a seamless interface to Quantum, 984, and Compact PLCs. All parameters, diagnostics and operational commands are accessible via Modbus Plus. The option board provides a 9-pin D-shell connector for easy wiring and communicates via a 1 Mbps, twisted-pair, Local Area Network. Each Modbus Plus network supports up to 63 drives.

- Mounts at option connector 2CN. Covers 3CN.

Model No. CM071.....\$

NETWORK COMMUNICATION OPTIONS - CONTINUED

Ethernet Modbus TCP/IP. This option complies with the Modbus TCP/IP protocol specification. This allows for Modbus communication over 10/100 Mbps Ethernet networks. All parameters, diagnostics and operational commands are accessible via Modbus TCP/IP. This option supports up to 10 simultaneous PLC/PC connections.

- Mounts at option connector 2CN.

Model No. CM090.....\$

Dimensions
Weights & Heat Loss
G7 Drive

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Rated Input Voltage	Basic Drive Model Number CIMR-G7U	Rated Output Current (Amps)	Nominal HP	Physical Dimensions (in.)			Weight (lbs.) ⁽¹⁾	Standard Enclosure	Drawing Number ⁽²⁾	Heat Loss (watts) ⁽³⁾					
				H	W	D				Heatsink	Internal	Total			
208V/ 240V/ 230V	20P41	3.2	3/4	11.02	5.51	6.30	6.6	NEMA 1	DD.G7.FR1.N1.01	21	36	57			
	20P71	6	1			7.09			DD.G7.FR1.N1.01	43	42	85			
	21P51	8	2			7.09			DD.G7.FR1.N1.01	58	47	105			
	22P21	12	3			7.09			DD.G7.FR2.N1.01	83	53	136			
	23P71	18	5	11.81	7.87	7.87	13.2 15.4		DD.G7.FR2.N1.01	122	64	186			
	25P51	27	7.5			7.87			DD.G7.FR3A.N1.01	187	87	274			
	27P51	34	10			7.87			DD.G7.FR3A.N1.01	263	112	375			
	20111	49	15			13.78			DD.G7.FR4A.N1.01	357	136	493			
	20151	66	20	14.96	9.45	8.27	24.2	NEMA 1	DD.G7.FR4C.N1.01	473	174	647			
	20181	80	25 & 30			21.06	10.00		DD.G7.FR5.N1.01	599	241	840			
	20221	96	30			24.21			DD.G7.FR6A.N1.01	679	257	936			
	20300	130	40 & 50			23.62	14.76	11.81 12.99	DD.G7.FR7.IP00.01	878	362	1240			
	20370	160	60			28.54			DD.G7.FR8.IP00.01	1080	434	1514			
	20450	183	60	28.54	17.72	13.78	189 191		DD.G7.FR10.IP00.01	1291	510	1801			
	20550	224	75			33.46			DD.G7.FR10.IP00.01	1474	607	2081			
	2075	300	100	34.84	19.69	14.17	238	Protected Chassis	DD.G7.FR11.IP00.01	2009	823	2832			
	20900	358	125			22.64			DD.G7.FR12.IP00.01	1660	871	2531			
	21100	415	150			14.96			DD.G7.FR12.IP00.01	2389	1194	3583			
480V	40P41	1.8	3/4	11.02	5.51	6.30	7.7	NEMA 1	DD.G7.FR1.N1.01	10	39	49			
	40P71	3.4	1 & 2			7.09			DD.G7.FR1.N1.01	21	44	65			
	41P51	4.8	3			9.9			DD.G7.FR2.N1.01	33	46	79			
	42P21	6.2	3			9.9			DD.G7.FR2.N1.01	41	49	90			
	43P71	9	5	11.81	7.87	7.87	15.4		DD.G7.FR2.R.N1.01	77	63	140			
	44P01	11	7.5			13.78			DD.G7.FR2.R.N1.01	100	66	166			
	45P51	15	10			21.06	10.98	10.24	DD.G7.FR3A.N1.01	132	80	212			
	47P51	21	15			25.00			DD.G7.FR3A.N1.01	197	107	304			
	40111	27	20	25.00	12.95	11.22	22	NEMA 1	DD.G7.FR4B.N1.01	246	116	362			
	40151	34	20			12.95			DD.G7.FR4B.N1.01	311	135	446			
	40181	42	25			14.17			DD.G7.FR6B.N1.01	354	174	528			
	40221	52	30			11.22			DD.G7.FR6B.N1.01	516	210	726			
	40301	65	40	28.15	12.95	11.22	86	Protected Chassis	DD.G7.FR9A.N1.01	633	246	879			
	40371	80	60			12.95			DD.G7.FR9A.N1.01	737	285	1022			
	40451	97	75			11.22			DD.G7.FR9B.N1.01	929	340	1269			
	40550	128	100			11.22			DD.G7.FR10.IP00.01	1239	488	1727			
480V	40750	165	125	28.54	17.72	13.78	200	NEMA 1	DD.G7.FR10.IP00.01	1554	597	2151			
	40900	195	150			25.00			DD.G7.FR11.IP00.01	1928	762	2690			
	41100	240	200			12.95			DD.G7.FR11.IP00.01	2299	928	3227			
	41320	270	200	36.06	22.64	14.96	363 385		DD.G7.FR13.IP00.01	2612	1105	3717			
	41600	302	250			14.96			DD.G7.FR13.IP00.01	3614	1501	5115			
	41850	370	300	51.38	27.95	16.34	579 616	Protected Chassis	DD.G7.FR14.IP00.01	4436	1995	6431			
	42200	450	350			16.34			DD.G7.FR14.IP00.01	5329	2205	7534			
	43000	605	400 & 500			16.34			DD.G7.FR15.IP00.01	6749	2941	9690			

(1) This data represents the drive weight only, not shipping weight

(2) Outline Drawings are not included in this pricebook. Please refer to our website at www.drives.com for outline drawings.

(3) Total Heat Loss is the amount of heat dissipated by the drive at full load. This data is separated into "Heatsink" and "Internal" values.

The value in the "Heatsink" column is the amount of heat dissipated by the heatsink, and would not need to be considered when calculating the enclosure size for applications that may require mounting the heatsink out the back of the enclosure.

Software, Drawings, Manuals

DriveWizard Software Kit. This software package allows uploading and downloading of parameters via a PC for data storage and for programming of a drive. The software also includes graphing and monitoring tools. It is a Windows-based program designed to make startup, commissioning, and troubleshooting of Yaskawa drives as simple as possible. Refer to our website at www.drives.com for more information, including minimum system requirements. This kit includes the DriveWizard program on CD and a PC interface cable.

Model No. DWST616-C2.....\$

DriveWizard Software. Software CD only. The software can also be downloaded for free on our website www.drives.com.

Model No. CD.DW.01.....\$

PC Interface Cable. This 6 foot cable interconnects the G7 keypad port to the 9-pin communications port on a PC. This cable is used in conjunction with DriveWizard software.

Model No. UWR00468-2.....\$

Approval/Special Drawings. Pricing for drives and options are based on standard documentation, which consists of one Technical Manual, standard Instruction Sheets, Wiring Diagrams, and Outline Drawings. When approval or special drawings must be prepared and submitted to the customer, a Drawing Price Addition must be made for each different drive being offered. Material procurement and manufacture will not commence until written drawing approval is received by the factory.

Price Addition: 3% of list price for drive and all included options, or \$ list, whichever is greater

Technical Manuals. One manual and CD-ROM is included with each drive at no charge when shipped from the factory.

Additional paper copies of User Manual:
Part No. TM.G7.01.....\$ each

Additional copies of CD-ROM:
Part No. CD.AFD7.01.....\$ each

Technical Training

In today's world of global competition, it is impossible for a company to survive without "state-of-the-art" technically trained associates and customers. Yaskawa Technical Training Services (TTS) is comprised of engineers who are specialists in their field.

Yaskawa Electric America has three training facilities in the United States. The primary training facility is in Yaskawa Electric America's North American Headquarters in Waukegan, Illinois (45 miles north of Chicago, 50 miles south of Milwaukee). This facility has six training rooms; two lecture halls, two training rooms and two training labs.

Besides the possibility of attending training classes in Waukegan and Los Angeles, Yaskawa Electric America can also bring training to the customer. On-site classes are available in two varieties. The first is to duplicate the official training classes at the customer's location. Full functioning demo units, data projector, computer and documentation can be shipped to recreate the official class on-site. The second variety is road show training. Road show training is a one-day training class that is specifically tailored to the students' needs and questions. Only basic demos are used and the topics covered in class are generated by the students in attendance.

The Yaskawa Virtual Training Room is another training option. All you need is an Internet connection and a telephone. This is a live, interactive training class, which gives you the ability to talk to the instructor as well as other students. The Internet connection allows us to show slides and demonstrate software packages. The telephone is for the audio portion of the training class. Web classes can be found on the Yaskawa formal training schedule and can also be done on-demand, per the time and preference of the customer.

Training Classes Available

G7 Sales/Web Class

Short, information packed class designed to present ample specific product information in a short amount of time, typically 1-3 hours. Can be done live or over the web.

To enroll, contact Technical Training Services.

Phone: 1-800-Yaskawa (1-800-927-5292) and (then dial 2 for "Drives" and 4 for "Training")

Fax: 847-887-7185

E-mail: training@yaskawa.com

Check out the latest class schedule and cut sheets at www.drives.com

Terms & Conditions

YASKAWA ELECTRIC AMERICA, INC. - STANDARD TERMS AND CONDITIONS OF SALE

1. GENERAL:

(a) Any sale of products or services by Yaskawa Electric America, Inc. ("YEA") is governed exclusively by these Standard Terms and Conditions of Sale ("Standard Terms") and shall supersede any inconsistent or additional terms on Buyer's purchase order or any other document. These Standard Terms constitute the final, complete and exclusive agreement between YEA and the Buyer as to the subject matter hereof. YEA hereby objects to any inconsistent or additional terms. This Agreement may be amended only in writing signed by an authorized representative of YEA.

(b) Any order placed with YEA must be in the form of a written purchase order or letter from Buyer ("Order") and shall set forth all information necessary for YEA to fill the Order, if accepted. All proposals, quotations or similar communications from YEA will be considered invitations to Buyer to submit an Order. A binding sales contract will result only when YEA accepts Buyer's Order, at YEA's office in Waukegan, Illinois or such other place as designated by YEA. YEA reserves the right to bill any Order at a minimum of \$100, plus any additional charges provided for herein.

(c) All products shall be packaged for domestic shipment in accordance with YEA's standard specifications. If special packaging is required, it must be clearly requested on Buyer's Order. The price for any special packaging shall be billed to Buyer.

2. WARRANTY:

(a) YEA warrants that each new and unused product sold by YEA shall be free of defects in material workmanship for a period of one (1) year from the date the product is first used by Buyer, or 18 months from the date of shipment, whichever occurs first. YEA warrants that its services shall be free of defects in workmanship for a period of ninety (90) days from the date they are first provided. Within the applicable warranty period, YEA will, at its sole discretion, either repair, replace or return the purchase price paid to YEA for any product, part or service found by YEA to be defective; provided that the subject product is used under normal conditions for which it was designed and installed, operated and maintained in accordance with YEA's instructions and (subject always to such instructions) in accordance with generally accepted industrial practices.

(b) YEA's warranty obligation shall be conditioned upon receipt by YEA of written notice of any alleged defects within sixty (60) days after discovery. YEA will not be responsible or accept invoices for unauthorized repairs to any products, even if defective. YEA shall not be responsible for any products which have been altered, abused, misused, or improperly installed or repaired, or for any loss, damage, defect, claim or non-performance resulting from or attributable to Buyer's specifications.

(c) Where Buyer requests that YEA supply non-stock products or component parts manufactured by a third-party, YEA will, to the extent permitted, pass through to Buyer any warranty of the manufacturer. As to such items, Buyer's sole remedy for breach of warranty shall be the remedy offered by and available from the manufacturer. YEA shall have no liability, whether in contract, tort or otherwise, for such products.

(d) YEA does not guarantee production rates or the quality of goods made using YEA's products or services, nor shall any longer warranty periods apply, except as agreed in writing signed by an authorized YEA representative.

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3. DRAWINGS/MEASUREMENTS:

All drawings, tables, graphs and the like submitted by YEA or contained in YEA's publications shall be regarded as approximations only. Weights, measurements, capacities and all other particulars of products or services offered by YEA are approximations only. YEA is not responsible for such approximations, including, in particular, based on data supplied by Buyer.

4. INFRINGEMENT:

YEA's liability for infringement (and the liability of any parent or affiliated company of YEA) is limited to YEA's defense of any suit or proceeding brought against Buyer based on a claim that products sold hereunder, when employed in the manner intended by YEA, constitutes an infringement of any patent of the United States. If Buyer's use of the products in the manner intended by YEA is finally enjoined in such action, YEA shall, at its option, procure for Buyer the right to continue using the products, replace the same with non-infringing products, modify the products so that they become non-infringing equivalent products, or refund the purchase price (less allowance for use, damage or obsolescence). YEA makes no warranty against patent infringement resulting from portions of the products made to Buyer's specifications or the use of products in combination with any other products or in the practice of any process, and if a claim, suit or action is brought against YEA or any parent or affiliate of YEA, Buyer shall defend, indemnify and save YEA (and its parent/affiliates) harmless from and against any and all claims, losses or damages arising therefrom.

5. SHIPMENT, FORCE MAJEURE, PRICES AND ERROR:

(a) Shipment/delivery dates are approximations only. YEA shall not be liable to pay any penalty or damages, including consequential damages, for any delay in shipment.

(b) In no event shall YEA be liable for any damages, including consequential damages, caused by delays or non-performance resulting from or related to force majeure or other causes beyond YEA's reasonable control, including, but not limited to, war, blockade, civil disturbances, strikes and lockouts, labor shortages, fire and other casualties, acts of nature, accidents and governmental acts (including regulations concerning export and import licensing and currency exchange). In case of non-delivery, YEA's obligation shall be limited to the refund of any advance payment received from Buyer.

(c) All claims for loss of or damage to products, whether concealed or obvious, must be made, in writing, to the carrier and to YEA by Buyer as soon as possible after receipt of shipment, and in no case beyond 30 days of shipment, or such claims shall be deemed waived. YEA will render reasonable assistance in providing information necessary for Buyer to process such damage claims with the carrier or any insurance company.

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(d) YEA's quoted prices are firm for thirty (30) days from the date of YEA's written proposal. Thereafter, the applicable prices are those in effect at the time Buyer's Order is placed with YEA. YEA will notify Buyer of any price changes for incorporation into a revised Order prior to acceptance by YEA. Pricing based on volume discounts is subject to adjustment by YEA if actual shipping volumes do not meet minimum volume requirements of agreement. Clerical errors in any element of a proposal, purchase order, invoice or contract are subject to correction by YEA.

(e) (1) Buyer agrees to accept delivery within fifteen (15) days following the anticipated date of delivery. If Buyer refuses to take delivery within the fifteen (15) day period, YEA reserves the right to charge Buyer for storage charges plus interest.

(2) All shipments are F.O.B. YEA's (or its suppliers') manufacturing plant or warehouse. YEA will, at Buyer's expense, arrange for the transportation of the products from the manufacturing plant or warehouse designated by YEA. Buyer is responsible to timely procure all necessary export and import licenses and all permits required for the consummation of the transaction.

6. TERMS OF PAYMENT:

(a) All payments are due within thirty (30) days of YEA's invoice. YEA reserves the right to require payment in advance, or satisfactory security, for any shipment or sale. YEA may cancel any shipment or Order for any Buyer which has failed to make payment or comply with any other provision of these Standard Terms. YEA reserves the right to seek any other remedy available at law or equity. Payment shall be made at the agreed time, to the place specified, and in the currency indicated on YEA's invoice. Buyer's failure to pay at the agreed time and place constitutes a waiver of Buyer's right to demand YEA's performance under the contract.

(b) When an account becomes past due according to its payment terms, Buyer shall pay interest on the balance due, at the greater of 1.50% per month (18% per annum) or the maximum permitted by law, until paid in full.

(c) If delivery and/or payment in installments are accepted by YEA, Buyer's failure to pay any installment when due shall give YEA the right to suspend work or delivery until such payment is made. In the event that any such default by Buyer continues for more than fifteen (15) days, YEA may then cancel the contract by written notice to Buyer. Upon cancellation of an installment contract, all items already delivered to and paid for in full by Buyer will be transferred to Buyer "AS IS, WHERE IS," without any warranty.

(d) All duties, tariffs, fees, costs and other charges connected with shipment, insurance, exportation and importation of the products are the responsibility of Buyer, and, if paid by YEA, such expenses may be recovered by YEA from Buyer, and Buyer shall indemnify YEA against claims for the same. Buyer is responsible for all taxes applicable or related to this transaction, including all sales, use and excise taxes.

7. RISK OF LOSS:

Risk of loss and/or damage to the products shall pass to Buyer upon delivery thereof to Buyer or its representative, or to a carrier for shipment to Buyer or its designated customer, as the case may be, at the manufacturing plant or warehouse of YEA or its supplier. Buyer is responsible to obtain insurance coverage on all shipments of products supplied by YEA.

8. RETURNS/CANCELLATION CHARGES:

Buyer shall not return any product to YEA without the written consent of, and upon terms agreed to, by YEA. If Buyer refuses to accept delivery, or improperly revokes acceptance of product,

Buyer shall be responsible for YEA's cancellation charges and expenses. Before returning products, a Return Merchandise Authorization ("R.M.A.") number must be obtained from YEA. Products returned without an R.M.A. number clearly marked on the outside of the shipping carton will be refused. Except for approved warranty returns, YEA will only accept for return and credit new, unused, current stock items, in the original packaging and undamaged. Buyer shall be responsible for all freight charges, import/export charges, duties, tariffs, taxes, insurance and risk of loss/damage regarding return shipment to YEA.

9. SECURITY INTEREST:

To secure any indebtedness due and owing from Buyer from time to time Buyer hereby grants to YEA, and YEA hereby reserves, a continuing purchase money security interest in all Yaskawa-brand and other products heretofore or hereafter sold and delivered to Buyer by YEA, and all related parts, components and accessories therefor, and all proceeds arising from the sale or other disposition of the foregoing, including, but not limited to, cash, accounts, contract rights, accounts receivable, instruments and chattel paper. Buyer shall at no time grant any security interest that conflicts with that granted to YEA herein. Buyer shall cooperate with YEA, and hereby appoints YEA as its attorney-in-fact, to execute and file, on Buyer's behalf, any documents necessary to evidence and perfect YEA's security interest.

10. GOVERNING LAW, FORUM AND JURY WAIVER:

These Standard Terms and the relationship of the parties hereto shall be governed by the internal laws of the State of Illinois, U.S.A., without regard to its choice of law rules. For all claims or disputes arising out of or relating to the sale of products or services by YEA and/or the relationship of Buyer and YEA, Buyer shall file any and all lawsuits or claims exclusively in the state or federal courts located in Cook County, Illinois. Buyer hereby submits to the personal jurisdiction of said courts and waives any claim of improper or inconvenient venue. To the fullest extent permitted by law, Buyer hereby agrees to waive the right to trial by jury for all claims or disputes arising out of or relating to the sale of products or services by YEA and/or the relationship of Buyer and YEA. The parties agree that U.N. Convention of Contracts for the International Sale of Goods shall not apply to their relationship or the sale of products by YEA.

11. MISCELLANEOUS:

(a) Failure on the part of YEA to enforce any of its rights derived from this contract shall never be construed as a waiver of any of YEA's rights.

(b) The invalidity of one or more of the clauses herein shall not affect the validity of the other clauses, which for this purpose are considered severable.

(c) Any use by Buyer of any YEA trademark must be approved by YEA in writing.

(d) Buyer may not delegate its performance or assign its rights under this Agreement except upon the express written consent of YEA. In any case, these Standard Terms shall be binding upon the successors and legal representatives of Buyer.

(e) Buyer shall comply with all applicable laws and regulations regarding the use, import and export of the products sold hereunder. The products and services to be sold hereunder are not intended for use in any nuclear, chemical or weapons production or environmental damage. If Buyer uses the products or services for such or other impermissible purposes, it shall indemnify, hold harmless and defend YEA, all parent and affiliated companies of YEA, from and against all related claims and damages.

(f) All rights and remedies available to YEA under the Uniform Commercial Code and other applicable law are reserved to YEA as remedies in the event of Buyer's default.

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Data Subject to change without notice.



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